

Curtis increased the ventilation apertures about the mirror so that about one-sixth of the area of the back of the mirror was directly exposed. This, apparently, had little effect, so a refrigerating machine was obtained and put into operation. The machine is of the anhydrous ammonia type, and is automatic in action. To cool the mirror the telescope is placed vertical, and a movable box brought into position to enclose the cooling pipes and the mirror end; two electric fans circulate the cooled air freely around the mirror. This operation is commenced about three hours before sunset, and when the thermometer shows a fall of 5° C. or 6° C. the case is removed, about forty minutes before sunset. No moisture forms on the silvered surface, which may be 3° C. or 4° C. below the temperature of the surrounding atmosphere when observations commence. This method has proved very successful, for focal changes are, as a rule, not noticeable, and scarcely ever exceed five millimetres. Dr. Curtis's account of his experiments also appears in the current number of the *Astrophysical Journal*, and is there illustrated by two photographs, the one showing the telescope and spectrograph, the second showing the wooden cooling chamber in position.

ORBITS OF SPECTROSCOPIC BINARIES.—From plates taken with the Mills reflector, the orbits of the spectroscopic binaries α Carinæ, α Pavonis, and κ Velorum have been determined by Dr. Curtis, and their elements are published in No. 122 of the Lick Observatory Bulletins. α Carinæ is a star of magnitude 3.5, and its spectral type is given as B3A in the Harvard classification. According to the elements now published, its period is 6.744 days, the velocity of the system is $+23.3$ km., and the length of the semi-major axis of the orbit is 1,960,000 km. For α Pavonis (mag. 2.0) the period is 11.753 days, the velocity of the system is $+2.0$ km., and the length of the semi-major axis is 1,170,000 km.; the orbit is nearly circular. The period of κ Velorum (mag. 2.6) is 116.65 days, the velocity of the system is $+21.9$ km., and the length of the semi-major axis is 73,200,000 km. All three stars are of the same type of spectrum.

MELLISH'S COMET, 1907e.—A new set of elements and an ephemeris extending to December 31.5 are given in Lick Observatory Bulletin No. 124 for Mellish's comet. The position for December 11.5 is $\alpha=0^{\text{h}}$. 12m., $\delta=+27^{\circ} 2'$, about $1\frac{1}{2}^{\circ}$ south-east of α Andromedæ, and the brightness is about one-third that at the time of discovery. The following positions are taken from the ephemeris:—December 23.5 (G.M.T.), $\alpha=23^{\text{h}}$. 56m., $\delta=+26^{\circ} 30'$; December 31.5, $\alpha=23^{\text{h}}$. 52m., $\delta=+26^{\circ} 30'$ (brightness = 0.09).

SOLAR PROMINENCES IN 1906.—Prof. Ricco's annual summary (1906) of the prominence observations made at Catania appears as an abstract from vol. xxxvi. (1907) of the *Memorie della Società degli Spettroscopisti Italiani*. The following are the mean values for the year:—daily frequency = 2.7, complete extension along the limb = $7^{\circ}.5$, height of prominences = $44''.2$. As one would expect near the epoch of maximum, these values are nearly equal to those obtained in 1905. It is interesting to note that whereas the sun-spot frequency curve showed maxima in February and November, 1905, the prominence maximum appears to have been relatively retarded, the second greatest maximum recorded at Catania having occurred in March, 1906. Considering the heliographic latitude of the prominences in 10° zones, the principal maximum took place in $\pm 20^{\circ}$ to $\pm 30^{\circ}$, as in 1905, but the secondary maximum was elevated ten degrees from $\pm 60^{\circ}$ to $\pm 70^{\circ}$ to $\pm 70^{\circ}$ to $\pm 80^{\circ}$; this is another characteristic of the maximum epoch. Excepting the fourth trimestre, the number of prominences observed in the northern hemisphere of the sun was greater than that observed in the southern hemisphere, the numbers for the year being 284 and 185 respectively.

SEARCH EPHEMERIS FOR COMET 1907a (GIACOBINI).—Believing that comet 1907a might still be observed in large instruments or found on long-exposure photographs, Prof. Weiss publishes a search-ephemeris for this object in No. 4218 of the *Astronomische Nachrichten* (p. 300, December 2). The comet is now some 10 m. west of α Persei, and its estimated magnitude is 13.8.

PRIZES AWARDED BY THE PARIS ACADEMY OF SCIENCES.

Geometry.—The Francœur prize is awarded to Emile Lemoine, for the whole of his work in mathematics; the Bordin prize to F. Enriques and F. Severi jointly, the Vaillant prize being divided between J. Hadamard, Arthur Korn, Giuseppe Lauricella, and Tommaso Boggio.

Mechanics.—A Montyon prize is awarded to M. Cuénot, for his experimental studies on the flexure of rails; an exceptionally honourable mention to M. Petot, for his work on the theory of automobiles; the Poncelet prize to Colonel Renard, for his mathematical and experimental researches in mechanics, and for his contributions to aëronautics.

Navigation.—The extraordinary prize of six thousand francs is divided between M. Gayde (two-thirds) and J. Estève (one-third), the Plumey prize not being awarded.

Astronomy.—The Pierre Guzman prize is not awarded. T. Lewis receives the Lalande prize, M. Giacobini the Valz prize, and M. Gaillot the G. de Pontécoulant prize.

Geography.—The Gay prize is awarded to Jean Charcot, for his Antarctic explorations, the Tchihatchef prize being divided between Jacques de Morgan and Paul Crépin Bourdier de Beauregard.

Physics.—Lucien Poincaré receives the Hébert prize, for his book on modern physics; P. Langevin the Hugues prize, for his work on the mobility of gaseous ions and the properties of electrons; M. Mathias the Gaston Planté prize, for his work on terrestrial magnetism; Paul Villard the La Caze prize, for the whole of his researches in physics; and Pierre Weiss the Kastner-Boursault prize, for his experimental and theoretical work in magnetism.

Chemistry.—The Jecker prize is divided between MM. Blaise, Marcel Delépine, and Hamonet, and the Cahours prize between MM. Gain, Mailhe, and Guillemard. A Montyon prize (unhealthy trades) is awarded to M. Bonneville, for his discovery and manufacture of a cement in which metallic zinc replaces the red lead commonly used.

Mineralogy and Geology.—M. Martel is awarded the grand prize of the physical sciences, for his studies on underground waters, and J. J. H. Teall the Delesse prize, for his researches in petrography.

Botany.—The Desmazières prize is awarded to General E. G. Paris, for his "Index Bryologicus"; the Montagne prize to F. Guéguen, for his work on the lower fungi; the De Coincy prize to F. Gagnepain, for his work on the classification of the Zingiberaceæ; the Thore prize to M. Bainier, for his work on the lower fungi; and the de la Fons-Mélécocq prize to C. Houard, for his memoir on the parasitic deformations of plants in northern France.

Anatomy and Zoology.—Charles Alluaud receives the Savigny prize, for his work on the invertebrates of Upper Egypt and the adjacent portions of Africa.

Medicine and Surgery.—Montyon prizes are awarded to J. Henniquin, for his work on the treatment of fractures; C. Levaditi, for his researches on *Treponema pallidum*; and Maurice Villaret, for his researches in connection with urinary secretion. Mentions are accorded to A. Thiroux and M. d'Anfreville, for their memoir on malaria in Senegal; MM. Nicolle and Mesnil, for their memoir on the treatment of trypanosomiasis by the benzidine colours; and René Gaultier, for his memoir on the functional exploration of the intestine by analyses of the fæces. Gustave Martin, Georges Pécaud, Pierre Breteau and Paul Woog, A. Desmoulière, and M. Guizez receive citations in connection with this prize. J. Guiart and L. Grimbert receive the Barbier prize for their book on chemical, microscopical, and pathological diagnosis. The Bréant prize (interest only) is divided between MM. Vaillard and Dopfer, for their researches on bacillary dysentery, and J. Ferran, for his work on the cholera bacillus. The Godard prize is given to Victor Nicaise, for his memoir on the indications and therapeutic value of total or partial nephrectomy in the treatment of hydatoid cyst of the kidney; the Baron Larrey prize to G. H. Lemoine, for his work on military hygiene; the Bellion prize to A. Chantemesse and F. Borel, for their memoir on the protection of the country from diseases introduced from abroad; the Mège prize to J. Castaigne and F. Rathery, for their work on the lesions of the convoluted tube of the kidney; and the Chaussier prize to A. Lacassagne, for his work on forensic medicine.

Physiology.—The Montyon prize in experimental physiology is divided between Maurice Nicloux and Denis Brocc-Rousseu, the former for his work on the physiological saponification of fatty substances, and the latter for his researches on the alterations of seeds, cereals, and forage. H. Bierry receives the Philipeaux prize, for his studies in cytotoxines; Gaston Seillière the Pourat prize, for his memoir on the utilisation of the pentosans by the animal organism; M. Laulanié the La Caze prize, for the whole of his work in the field of general physiology, the Lallemand prize being divided between E. Régis and Étienne Rabaud.

Statistics.—A memoir on statistical methods and their applications, by Lucien March, is accorded the Montyon prize in statistics. J. A. Fleury receives a very honourable mention for his memoir on the statistics of the city of Rouen, and Dr. Conor an honourable mention for his memoir on hysteria in the army.

History of Science.—Prizes are awarded to Gino Loria and F. Brunet, F. de Mély being accorded a very honourable mention.

General Prizes.—Adolf von Baeyer receives the Lavoisier medal; MM. Blaise, Delépine and Hamonet, Berthelot medals; Charles Frémont, the Trémont prize; J. H. Fabre, the Gégner prize; Mmes. Beclard, Cosco and Ruck, the Lannelongue prize; Charles Nordmann and Jean Brunhes, the Wilde prize; MM. Gonnessiat and de Seguiet, the Saintour prize; Pierre Duhem, the Petit D'Ormy prize (mathematical sciences); J. Künckel d'Herculais, the Petit D'Ormy prize (natural sciences); A. Cotton, the Pierson-Perrin prize; Léon Daum, the prize founded by Mme. la Marquise de Laplace; and Léon Daum, Georges Jean Painvin, Charles Marie Joseph Cambournac, and Louis Eugène Galatoire Malégarie, the prize founded by Félix Rivot.

The Leconte prize is not awarded this year.

THE JOURNAL OF THE ROYAL ANTHROPOLOGICAL INSTITUTE.

THE new volume of the Journal of the Royal Anthropological Institute is dedicated, on the occasion of his seventy-fifth birthday, to Prof. E. B. Tylor, of whom a fine portrait forms the frontispiece. The dedication dwells on his classical contributions to the science of anthropology—his "Researches into the Early History of Mankind" and "Primitive Culture"—works which enjoy the almost unique distinction of never having been superseded by the studies of later writers; on his career as professor of anthropology at Oxford, where, as the result of his teaching and personal initiative, a diploma course in the science has been established; and on the generous encouragement bestowed by him on the students of a younger generation. This compliment to a scholar who stands in the foremost rank is graceful and well deserved.

The president, Prof. Gowland, in his annual address continues his studies of burial mounds in Japan which were begun by his well-known paper contributed to vol. IV. of "Archæologia." Here he deals with the remarkable structures which cover the remains of the early emperors. Some of these are of enormous extent; one when first erected must have been not less than 1000 feet long and 600 feet broad, while in spite of denudation its summit now rises to the height of 84 feet. It seems certain that several of these mounds are as early as the first or second century of our era, and their construction continued for some five or six centuries after that date. It ceased with the establishment of Buddhism, when the custom of inhumation was replaced by cremation. The examples of metal work found in these monuments—iron armour, swords, horse-trappings of iron covered with thin gilt copper foil—illustrate the national skill in metallurgy in those early times. Terra-cotta figurines mark the transition from the custom of burying attendants with the dead sovereign, a reform which the "Nihongi" Chronicle attributes to the Emperor Suinin, who reigned at the beginning of the Christian era. At many of these monuments the Japanese, ardent worshippers of ancestors, still perform annual rites, and the mounds are protected from desecration.

The most important contribution to physical anthro-

pology is the account, by Prof. Cunningham, of perhaps the most remarkable head of one of the Australian aborigines which has ever reached this country. It is that of a man who died in 1905 in a lunatic asylum, and it was most skilfully prepared by Dr. Ramsay Smith by means of injections of formalin. This head is distinguished by the great prominence of the supraorbital regions of the forehead, which is receding and sloping, by the width of the zygomatic region, and by the retreating chin and almost complete absence of a mental prominence. The type does not, as might have been expected from the reported cause of death—organic disease of the brain—seem to be abnormal.

Mr. H. Balfour contributes a good museum article on what he terms the friction drum, a curious musical instrument consisting of a drum with a single membrane, to the centre of which is attached a string, horsehair, or short stick, which on being rubbed with the moistened or rosined forefinger and thumb creates rapid vibrations communicated to the membrane. The instrument appears in Europe, North and South America, Africa, Japan, and India. It seems impossible to discover the original centre of dispersion; in fact, there appears no reason why it should not have been independently discovered in Africa or India, where it appears earlier than in other regions.

Archæology is represented by an account, by Canon Greenwell, of a remarkable find by Major Sykes of bronze weapons, implements, and vessels at Khinámán, in south-east Persia. "It is impossible," he writes, "to overestimate the interest and value of this discovery. This arises not only from the nature of the articles themselves, but from the light it throws upon the early metallic stage of cultivation in that country, about which our information is very scanty." The axes are the most important and interesting. They could never have been used in war or for any other useful purpose, but were representative weapons made to be buried with the dead man in place of those which he used in life, or more probably were employed in processional rites, to be carried as a mark of dignity before a personage of rank. In the ornamentation, as in the case of two similar weapons previously discovered within the same Asian area, the lion appears as a prominent feature of the design.

EXPERIMENTS ON WIND-PRESSURE.

FURTHER experiments on wind-pressure were described by Dr. T. E. Stanton before the Institution of Civil Engineers on December 3. The first part of this research, of which the results were communicated to the same institution in December, 1903, was the investigation of the resultant pressure and distribution of pressure on flat plates normal to and inclined to the direction of a uniform current of air. The value of the constant K in the pressure velocity relation $P=KV^2$ was found to be 0.0027, a result somewhat smaller than those found by Dines, Frowde, and Langley. On the completion of this part of the work it was decided to make observations on flat surfaces of areas ranging up to 100 square feet when exposed to the wind, since general experience tended to show that in actual winds the velocity of which was not uniform over time or space, the mean pressure per square foot on a large surface was considerably less than that on a small one. For the purpose of the work a steel windmill tower was erected in the grounds of the National Physical Laboratory at Teddington. The experimental boards and models of structures were attached to a light framework carried by the cap of the tower, the height of the centre of the boards from the ground being 50 feet.

The results of observations on three pressure-boards, one 5 feet by 5 feet, one 5 feet by 10 feet, and one 10 feet by 10 feet, gave practically identical values of the constant in the pressure-velocity relation. In units of pounds per square foot and miles per hour, the mean value of this constant for the three boards was 0.0032. Further observations on the intensity of the pressure at the front and back of the boards appeared to show that the cause of the higher value of the constant compared with that obtained in the case of the small plates of the earlier experiments was the relatively greater intensity of the negative pressure at the